

Volume 1 TOC and Introduction

Table of Contents

Introduction.	4
Purpose of this Document.	4
Applicable Documents.	5
Contributing Authors.	5
Mission Background.	7
Science Data Overview.	7
Ancillary Data.	8
Data Access.	8
Appendices.	10

Introduction

Purpose of this Document

This MMS-SMART (Solving Magnetospheric Acceleration, Reconnection and Turbulence) Science Data Products Guide is intended to provide the general science community an explanation of the essential details for working with MMS-SMART data. It includes descriptions of the MMS-SMART instrumentation, science algorithms, data products and data access. The Data Products Guide is designed to define requirements and procedures for analyzing data, generating data products and for providing the access to those interested within the general science community. Included in the Data Products Guide are the following:

- Specific details of algorithms (in particular the calculation of spatial gradients from measured quantities);
- Models and visualizations;
- Theory tools;
- Derived inter-instrument and inter-S/C calibration parameters; and
- The inflow of S/C inter-ranging data.

The Data Products Guide will outline the methods by which the MMS mission support how survey and burst data are collected by the complement of science investigations comprising the MMS-SMART suite. The complement of science investigations contributing data for the MMS mission is as follows:

The Active Spacecraft Potential Control (ASPOC) is designed to generate beams of indium ions. The ions limit positive spacecraft potentials to +4V which are intended to refine the measurements provided by FPI, HPCA, ADP, and SDP.

The Energetic Particle Detector System (EPD) consists of an Energetic Ion Spectrometer (EIS) and an all-sky particle sampler known as the Fly's Eye Energetic Particle Sampler (FEEPS). In concert, these instruments measure:

- the energy-angle distribution and composition of ions (20 to 500 keV) at a time resolution of < 30 seconds;
- the energy-angle distribution of total ions (45 – 500 keV) at a time resolution < 10 seconds; and
- the course and fine energy-angle distribution of energetic electrons (25-500 keV) at a time resolution of <0.5 and <10 seconds, respectively.

The Fast Plasma Instrument (FPI) includes four dual electron spectrometers (DES) and four dual ion spectrometers (DIS) which measure velocity-space distribution of electrons from 10 eV to 30 keV and ions from 10 eV to 30 keV with time resolution of 30 ms, and 150 ms, respectively.

The FIELDS investigation includes a sensor suite consisting of axial and spin-double probe electric field sensors (ADP and SDP), two flux-gate magnetometers (AFG and DFG), a search-coil magnetometer (SCM), and an electron drift instrument (EDI). These instruments measure DC magnetic field with a resolution of 10 ms, DC electric field with a resolution of 1ms, electric plasma waves to 100 kHz, and magnetic plasma waves to 6kHz.

The Hot Plasma Composition Analyzer (HPCA) measures composition--resolved velocity-space distribution of ions from 1 eV to 40 keV with time resolution of 10 – 15 seconds.